Project Delivery Network

Geotechnical Design QC Checklist

Version
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Introduction

The Project Delivery Network Geotechnical QC Checklist is to be used with the UDOT QC/QA Procedure. This checklist is a tool to assist the project team in verifying all work is produced with due diligence, using acceptable industry standard techniques, available resources and data, and reasonable decisions by competent professionals. The checklist is a tool for the delivery of quality documents and cannot replace the sound judgment and experience of competent professionals. It is the Design Team's responsibility to verify the quality of project documents **before** distribution.

Checklist Instructions

For each deliverable listed, the QC Checker is to verify all items listed in the checklist are complete, along with any additional items the QC Checker deems necessary. The checklist items are not to be interpreted as the only items that need to be verified.

Once all items are verified, the QC Checker is to sign the associated cover sheet and upload it onto ProjectWise. The QC is not complete until the cover sheet is signed, dated, and uploaded onto ProjectWise. See the Project Delivery Network QC/QA Procedure for the appropriate cover sheet.

QC reviews are to be completed **before** distribution.

The following explanations are to aid in completing the QC checklist items:

- A checklist item deemed "complete", "correct", or "accurate" does not denote that the item is perfect, but rather that the item satisfies design criteria based on known information, acceptable techniques, and sound judgment."
- A checklist item deemed "addressed" denotes the item as "reviewed all known concerns and verified the concerns are appropriately mitigated and satisfy design criteria." Addressed concerns are not necessarily incorporated into the design, but satisfactorily mitigated.
- A checklist item deemed "identified" denotes the item as "an acceptable and economical approach to satisfy design criteria based on known information."
- A checklist item deemed "verified" denotes the item as "verified the approach/conclusion as acceptable based on known information."
- Use check boxes to verify checklist items are complete. If a checklist item is *not applicable* to the current project, place an NA over the check box to denote the item as not applicable. This will allow the quality assurance to verify all items were addressed.
- Use the comment sections of the Cover Sheets to address exceptions, assumptions, and unique aspects of the project. The comments will help others understand why certain decisions were made and their impacts on the project.

Geotechnical Instructions

1G1 does not require a cover sheet.

1G1 Conduct Preliminary Geotechnical Investigation

Identify potential issues that may affect the design and construction of the project. Identify preliminary mitigations and develop a plan to select and design appropriate mitigations.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT Project Delivery Network
3. UDOT QC/QA Procedures
4. UDOT Practical Design Guide

Preliminary Geotechnical Investigation

1. ☐ All known information was reviewed and summarized. The following sources were researched for the summary:
    a. ☐ Previous geotechnical/geological investigations/reports
    b. ☐ Previous construction plans/as-builts
    c. ☐ Construction monitoring data
    d. ☐ Geologic Mapping
    e. ☐ Research reports
    f. ☐ Landslide/rock fall evaluations and studies
    g. ☐ Seismic studies (including site specific analysis)
2. ☐ A field visit was conducted and observations summarized. The following items are addressed in the summary.
    a. ☐ Maintenance history and existing conditions
    b. ☐ Site accessibility and potential traffic problems
    c. ☐ Topography
    d. ☐ Potential geotechnical subsurface investigation utility conflicts
    e. ☐ Surface water
    f. ☐ Erosion patterns
    g. ☐ Geologic structure and soil/rock profiles
    h. ☐ Additional surface features
    i. ☐ Landslide/rockfall potential
3. ☐ Preliminary liquefaction/lateral spread review was conducted.
4. ☐ All known issues that may impact or affect the design and construction are included in the summary.
5. ☐ Preliminary strategies adequately address each known issue.

Preliminary Work Plan (Scope)

1. ☐ Summary of preliminary geotechnical findings and assumptions is brief and accurate.
2. ☐ The information needed to verify and complete the final geotechnical design is identified.
3. ☐ The preliminary work plan (scope) for obtaining the necessary information and completing the geotechnical investigation includes the following:
    a. ☐ A plan
    b. ☐ Cost estimate
    c. ☐ Schedule
    d. ☐ Methods for collecting and testing samples, including sampling intervals

3G1 Conduct Geotechnical Investigation

Conduct subsurface exploration for all roadway fills and cuts, retaining walls, and structures. Coordinate with roadway and structure design engineers to identify the location of the subsurface explorations. Refer to the *UDOT Geotechnical Manual of Instruction* for guidance.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT CADD Standards
3. UDOT Project Delivery Network
4. UDOT QC/QA Procedures
5. UDOT Practical Design Guide

Subsurface Exploration Plan

1. ☐ All exploration locations are accepted by the UDOT Geotechnical Section before field work has begun.
2. ☐ All potential permits and necessary clearances are identified and obtained.
    a. ☐ UDOT encroachment permits
    b. ☐ Permission to access private property
    c. ☐ Railroad right of way
    d. ☐ Environmental clearances and permits
3. ☐ Access and layout of the subsurface explorations are clear and complete.
    a. ☐ Cut and fill slope cross sections are included.
    b. ☐ Foundation locations and sizes are included.
    c. ☐ The subsurface exploration and soil testing plan are complete for all investigations.
    d. ☐ The field reconnaissance plan is complete.
    e. ☐ Environmentally sensitive sites are identified.
4. ☐ Traffic control plans are complete.
5. ☐ All utility owners received the locations of the proposed subsurface explorations.
6. ☐ Utility clearances were obtained through owners and Blue Stakes.
7. ☐ All field drill logs meet the G-MOI standards.

Submit Samples for Testing

1. ☐ All samples follow the AASHTO requirements for custody logging. Any deviations from AASHTO requirements have been well documented and the potential impacts recorded.

3G1 Continued

2. ☐ All samples have been handled in accordance with AASHTO and G-MOI requirements. Any deviations from AASHTO or G-MOI requirements have been well documented and the potential impacts recorded.
3. ☐ All samples have necessary documentation for transfers and storage to the lab.
4. ☐ All field logs are submitted with samples.

Subsurface Exploration Location Sketch

1. ☐ All subsurface exploration locations are included.
2. ☐ All locations include the correct project stations, offsets (or northing/ easting) and ground surface elevations.

3G2 Conduct Geotechnical Testing

Conduct laboratory soil testing and prepare the soil test summary.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT Project Delivery Network
3. UDOT QC/QA Procedures
4. UDOT Practical Design Guide

Individual Soil Test Results

1. ☐ The testing program is in accordance with G-MOI standards and accepted by the UDOT Geotechnical Section prior to testing.
2. ☐ The field logs are included with the testing program.
3. ☐ All soil testing was conducted per AASHTO/AMRL standards and G-MOI standards.
4. ☐ The laboratory conducting the soil test is AASHTO/AMRL accredited.
5. ☐ The laboratory's QC/QA plan and QSM for testing were followed precisely.
6. ☐ All samples that were disturbed, contaminated, or otherwise compromised are noted as to the condition and potential impacts on the test results.
7. ☐ All samples are preserved and will be retained in their original state until released by UDOT.

Soil Test Summary

1. ☐ A summary table containing the laboratory testing results is provided.
2. ☐ All irregularities or compromised samples are noted.
3. ☐ All information is presented is clear, concise, complete, and accurate.
4. ☐ Required individual soil test reports are included.

3G3 Complete Foundation Type Memo

Complete structure foundation type memo for the structure design engineer.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT QC/QA Procedures
3. UDOT Practical Design Guide

Structure Foundation Type Memo

1. ☐ The structure foundation type analysis is appropriate and addresses all concerns in accordance with G-MOI.
2. ☐ All recommendations are appropriate and correctly assess the foundation type analysis.

4G1 Complete Geotechnical Design and Draft Report

Perform the geotechnical design for settlement, slope stability, liquefaction/lateral spread investigation, foundation, and retaining wall design and develop the draft geotechnical report for peer review.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT Project Delivery Network
3. UDOT QC/QA Procedures
4. UDOT Practical Design Guide

Geotechnical Design

1. ☐ All borings followed AASHTO and G-MOI standards.
    a. ☐ All boring logs were documented in the field at the time of boring. Any deviations from G-MOI requirements have been well documented and the potential impacts recorded.
    b. ☐ The boring log contains the information required in G-MOI Appendix C: Exploration Log Requirements.
    c. ☐ Boring logs are put in a graphical format that is compatible with MicroStation.
2. ☐ The Geotechnical Analysis and Design meets and addresses all items indicated in G-MOI.
3. ☐ Short term and long term designs are included.
    a. ☐ Cut/fill designs are appropriate.
    b. ☐ Settlement analysis is appropriate.
    c. ☐ Stability analysis is appropriate.
    d. ☐ Liquefaction and lateral spread analysis is appropriate.
4. ☐ All embankment and cut slop recommendations accurately address the analyses.
5. ☐ Instrumentation plan for construction and long term monitoring is suitable to meet requirements.

Draft Geotechnical Report

1. ☐ The report follows the requirements outlined in the G-MOI Appendix F.
2. ☐ All main headings, figures, appendices, and attachments are included in the table of contents with correct page numbers.
3. ☐ The purpose of the study and scope of work are clear, correct, and concise.
4. ☐ All descriptions, including existing site conditions, findings, laboratory testing, structures, earthwork, corrosion investigations, and others are written clearly, contain the correct information, and are concise.
5. ☐ All proposed improvements are appropriate and consistent with the overall project scope and existing conditions.

4G1 Continued

6. ☐ All pertinent figures are included, clear, and correct.
7. ☐ All pertinent reports and correspondence are referenced.
8. ☐ The instrumentation plan is appropriate for construction and long-term monitoring.
9. ☐ Any deviation from the G-MOI design was accepted by UDOT.
10. ☐ Preliminary project documents are included in the report:
    a. ☐ Draft soil data sheets.
    b. ☐ Draft special provisions
    c. ☐ Draft geotechnical plan sheets

4G2 Develop Geotechnical Project Documents

Develop geotechnical plan sheets, special provisions, and other documents required for the advertisement of the project.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT CADD Standards
3. UDOT Standard and Supplemental Drawings
4. UDOT Standard and Supplemental Specifications
5. UDOT Plan Sheet Development Standards
6. Specification Writer's Guide
7. UDOT Project Delivery Network
8. UDOT QC/QA Procedures
9. UDOT Practical Design Guide

Geotechnical Soil Data Plan Sheets

1. ☐ Soil data sheets include all necessary information.
    a. ☐ Correct logs
    b. ☐ Correct locations (station/offset or nothing/easting) and ground surface elevations
    c. ☐ Necessary labels, notes, and callouts
2. ☐ Soil data sheets are complete and ready to be sealed.

Geotechnical Special Provisions

1. ☐ All special provisions conform to the Specification Writers' Guide (SWG Chapter 11 Checklist).
2. ☐ A special provision has been created for each non-standard item.
3. ☐ All general and project specific special provision content is accurate, complete, and does not contain anything unnecessary.
4. ☐ The geotechnical special provisions are complete. (6)

Geotechnical Detail Plan Sheets

1. ☐ All *PSDS General Plan Sheet Requirements* are followed:
    a. ☐ All sheets are cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Call-out rules are followed.
    d. ☐ All title blocks are filled out correctly.

4G2 Continued

e. ☐ CADD standards are followed and maintained on each sheet.

2. ☐ The *PSDS DT Sheet Checklist* items are complete.
3. ☐ All details are labeled and dimensioned completely and correctly. (5)
4. ☐ All legend items are depicted and labeled correctly.
5. ☐ All necessary construction notes are included, complete, and correct.
6. ☐ All station/offset (or northing/easting) and ground surface elevation information is correct.
7. ☐ All quantities are correct.

4G3 Finalize Geotechnical Report

Conduct peer review, incorporate review comments, and produce the final geotechnical report.

References

1. UDOT Geotechnical Manual of Instruction (G-MOI)
2. UDOT Project Delivery Network
3. UDOT QC/QA Procedures
4. UDOT Practical Design Guide

Final Geotechnical Report

1. ☐ All review comments are addressed and any changes are incorporated.
2. ☐ All significant updates are verified through the applicable items from 3G1.
3. ☐ Written comment resolution was provided to all reviewers.
4. ☐ Final project documents are included:
    a. ☐ Draft soil data sheets
    b. ☐ Draft special provisions
    c. ☐ Draft geotechnical plan sheets
5. ☐ The Final Geotechnical Report is complete.